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[From a recent photograph by Elliott and Fry, London.]

PROFESSOR RODOLFO AMADEO LANCIANI, D.C.L. OXON.

Royal Gold Medallist 1900.

*Yours faithfully
Rodolfo Lanciani*

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WITH SUPPLEMENT, COMPRISING PAPERS READ BEFORE
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THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

SESSION 1899-1900.

THE OPENING ADDRESS. Delivered by the President, Mr. WILLIAM EMERSON,
at the First General Meeting, Monday, 6th November 1899.

COLLEAGUES, LADIES, AND GENTLEMEN,—

THE coming session, for which I have the honour of occupying this chair, is the sixty-fifth in the annals of the Royal Institute of British Architects. It is also the last session of the nineteenth century.

In glancing at the doings of the Institute since its foundation in 1834, the thing I most keenly feel in this particular position is the exceeding difficulty and responsibility of continuing and worthily upholding the character and dignity of the work that has been achieved by my predecessors in office.

I think the list of members of the Institute points to considerable and satisfactory progress in its affairs since its inception.

In 1837 we had 96 Fellows and Associates, of whom 15 only were country members. In 1887 we had 1109 members, of whom 259 Fellows and 435 Associates were from the Metropolis, and 169 Fellows and 246 Associates from the Provinces. In 1899, since the federation of the Country Societies with our London body—and this is a fact I wish to emphasise—our number has increased to 1612, of which 290 only are Fellows from the Metropolis, while 328 are from the Provinces, and 552 London Associates, and 442 from the country. The number of societies in alliance with us in England, Scotland, Ireland, and the Colonies is 17. These figures show that the old reproach of the Institute being merely metropolitan can no longer be cast at us, but that it has now attained a national character and influence, as much appreciated by the members of the profession in the country as in London. The work also of the Institute is increasing each year in importance, making its opinions heard and felt in respect of many important public questions relating to architecture.

The conservation of our national monuments, building projects both for the Metropolis and Provinces, the laying out of new streets and town improvements, legislative Acts in relation to building operations, the representation of the Institute on many public bodies and committees where questions affecting architecture or buildings may arise, the conduct of competitions, the promotion of the education of architects by periodical examinations, the

presentation of annual prizes and medals, are some few of the subjects constantly dealt with by the Institute. Moreover, the Government at times does not hesitate to consult us on questions connected with public works.

All these are fair proofs that the sixty-five years of our existence as a Royal Society have not been altogether wasted from a public and national point of view, apart from matters more immediately connected with the interests of the profession at large, and the future of architectural development.

And the extending influence of the Royal Institute of British Architects seems in no danger of languishing—if one may judge by the vivid interest taken in its working and actions by the junior members, who yearly evince a growing desire to have more voice in its affairs. In respect to this point I may say the Council had under deliberation at the end of last session what steps could be taken under the Charter to associate them more directly with the work of the Council. Amongst other things it was decided to remove all restrictions as to the eligibility of Associates for seats on the Council. Also, with a view to extending our sphere of influence, a Congress will probably be held in London this session, and in Glasgow in 1901 at the time of the Exhibition.

At certain periods in the lives of individuals it seems fit to review with a critical eye the actions of their past lives. So at the wane of a century notable for its progress in knowledge, culture, and civilisation, it may be opportune for us as architects to glance back and see if any advance has been made in our art (which the Charter asserts is esteemed and encouraged by all enlightened nations), and whether our efforts have been conducive to the benefit of mankind and the glory of our country through the part the Institute has played during the last sixty-five years in the furtherance of our national interests so far as they are affected by architecture.

There are several reasons why during this century great architectural developments might reasonably have been expected. It has on the whole been eminently peaceful and prosperous—which fact one would think should certainly affect all arts favourably; for rest, quiet, and prosperity seem essential to their growth. This peace and prosperity were brought about by the exhausted state of Europe at the cessation of the wars of the last century and the early years of this; by scientific inventions which developed our Empire, manufactures, and commerce; and in later years by the wealth and naval supremacy of Great Britain, the knowledge of the awful effects of modern warfare, exemplified during the Franco-German campaign, and the growth of civilisation and humanitarian sentiments.

At the close of the eighteenth century and the beginning of the nineteenth Europe had passed through a crisis unparalleled in its character and effects in history. The Seven Years' war, the wars of American Independence, and the Napoleonic wars ending in 1815 had raised our National Debt to some £900,000,000 sterling. Taxation was heavy, commerce stagnant, and there was little demand for labour.

Our impoverished and tired country was eager for peace and only too glad to turn its attention to home politics and peaceful pursuits. Then the experiences of the French Revolution taught England lessons which resulted in provisions for the more direct representation of all classes of people in the government of the country, and the Commons became the people's House of Parliament.

The more direct representation of the people tended to the furtherance of utilitarian and humanitarian projects. The humanitarian feeling of the age for the poorer classes was shown by the abolition of the slave trade. This feeling found further expression in such measures as the formation of new Poor Laws, Factory Legislation, School Boards, Prison Laws, Asylum Boards, National Training Schools of Art, Railway Bills, Building Acts, and County Councils.

All these have in many ways provided opportunities for architects and largely affected architecture. But in most buildings for humanitarian purposes architecture has been hampered by the many necessary laws relating to sanitary matters, such as the relation of light area to rooms, superficial floor space and cubic air space, heating, ventilation, and drainage.

Whether architecture as an art has been improved by these conditions is questionable. From the utilitarian standpoint, Committees and Boards seem universally to affect architecture in an adverse manner; in fact, æstheticism and utilitarianism appear to be always antagonistic. But surely a properly educated body of architects should be able to reconcile the two.

As well as from peace and the peaceful politics of the century, an advance in architecture might reasonably have been looked for from the influence of the increase of knowledge, our modern facilities of travel, the scientific discoveries and inventions, resulting in an enormous influx of wealth; also from archaeological research, and the desire for culture, from literary and artistic productions in books, journals, and publications which have educated the taste of the public and also influenced that of architects.

Looking at past history, art seems to have acquired fresh vigour and life and made the greatest strides at periods of learning and culture during years of independence and peace succeeding great wars or troublous times. These latter have often lent inspiration afterwards to architects and sculptors for the adornment of buildings, and given a living interest to their work. The comparative quiet of the fifteenth century, after the turbulent feudal ages, saw the rise of the Italian Renaissance. So, also, when the Western world settled down after the invasion of the Goths, the best periods of Gothic architecture were developed under the influence and teaching of the Holy Catholic Church. It was in the quieter years succeeding two centuries of continuous Mahomedan conquests that the stately and magnificent architecture in Africa, Spain, and the East developed itself. After the Persian sway had been destroyed at Thermopylæ and Platea, the Parthenon and the best Greek art were produced. So, too, at Rome the finest works of the Empire were created during the period of comparative calm and prosperity that followed the subjugation of Greece.

Some critics decry our present architecture and say it often shows little taste and no advance in art or style. But they should recollect that the highest level of the arts of any of the periods above mentioned was not arrived at in a day, nor did their architecture leap to perfection in a decade; and certainly architecture then could scarcely have had to fulfil the complicated requirements which make modern architectural problems so difficult. The Parthenon was erected the best part of half a century after Platea. The best of Roman architecture was not evolved till long after the battle of Actium; nor did the best phases of Gothic architecture appear until after many centuries of patient endeavour. Also, more than two centuries succeeded the rise of Mahomedanism before its literature and scientific knowledge developed, or its architecture resulted in the Mosque of Toloun. And many more passed before the erection of the tombs of the Caliphs, and before the elaborate refinements of the Alhambra and the perfect beauty of the Taj Mahal were arrived at. It took one hundred years of learning and study, initiated by the Humanists (who saw that, apart from the theological training of Mother Church, culture and scholarship are inseparable from true human greatness), to usher in the Italian Renaissance; and then a further century of study of Greek and Roman methods and of experiment and invention elapsed during the Quattro Cento (of which the Hybrid Classic and Gothic of the Certosa at Pavia and the Cathedral at Como are exemplifications), between the rise of Brunelleschi, the erection of his Pitti Palace and the dome of the Duomo of Florence, and the time of Bramante, Michael Angelo, Raphael, Giulio Romano, Peruzzi, Sansovino, Palladio, with the production of such works

as the dome of St. Peter's, the Chapel of the Medici, the Villa Madama, the Library of St. Mark's, and other works of the best period of the Renaissance.

Is there any reason for thinking that this history of an advance in, or a renaissance of, architectural art is in any way being repeated in our time, or that with the unexampled wealth and prosperity of this country during the last hundred years there has been a stirring of the dead bones of architecture, and that we may even now be travelling towards the goal of a development of a fresh expression of English thought, and an evolution of a new modern style that some day may be no disgrace to our Empire? Possibly this might be answered in the affirmative, but what the evolution of our present methods may become remains to be seen.

At the end of last century the renaissance of the Cinque Cento, which a century or more later found expression in this country through Inigo Jones and Wren, had for years been in its decadence, and was at a very low ebb in England. The ascendancy of classicism in our public schools and universities, where Greek and Latin were taught to the exclusion of modern languages and science, naturally had its influence on architects as well as on the general public, and resulted in a revived interest in Greek art and the study of Greek architecture. This was encouraged and assisted by the researches and publications of Dawkins and Wood, and Stuart and Adams. But though in the first quarter of this century the antique was the fashion, mere reproduction was sufficient for work which was inevitably devoid of life. Greek and Roman façades or porticoes were attached to modern structures, ancient designs were reproduced irrespective of their suitability to modern requirements—sometimes effectively, but always incongruously. The British Museum, St. Pancras Church, and many of the churches with Doric and other classic porticoes, and town halls of this period illustrate this.

After the first twenty years or so a more intelligent use was made of classic forms and details. It was then sought to give some expression to the specific purpose of each building, and some of our architects, following the methods of the Renaissance, began to use the borrowed details of Greece and Rome as a means to an end, and strove to adapt them more intimately to modern wants. The best works of Barry, Wyatt, Cockerell, and some others prove this. Also the printed works of Stuart and Revett, Cockerell and Penrose, showed the real meaning of classic architecture. It is sufficient for my purpose to name some of the most prominent of our classic architects, and their works. Amongst them were Decimus Burton, Soane, Nash, Wilkins, Basevi, Smirke, Wyatt, Barry, Cockerell, Elmes, Pennethorne, Cuthbert-Broderick, Gibson, of many of whose buildings we are proud.

As examples of some of these works may be named University College, the Fitzwilliam Museum, Cambridge, Bridgewater House, the Queen's Mews at Buckingham Palace, the Taylorian Institute at Oxford, the Travellers', Carlton, Reform, and Athenæum Clubs, the Royal Exchange, Regent Street Quadrant, the Royal Institution and High Schools at Edinburgh, the St. George's Hall, Liverpool, the Leeds Town Hall, the London University, Burlington Gardens, and our much-maligned National Gallery, which the late Lord Leighton said "had often been made the butt of curiously unmerited ridicule, though it is much easier to deride than better it." Also the Union Bank, Bishopsgate. Such buildings as these show that a distinct revival of classic architecture arose in this country during the second quarter of the century, and how great an influence classic education had upon men's minds, there being no recognised national style in which all were constrained by public sentiment to work. In fact classic architecture appeared to be well set in public estimation, with considerable chance of becoming the national style. Still, however greatly we may admire these works, they are wanting in the real life and interest found in the best buildings of any style, whether Greek, Roman, Gothic, or Renaissance. In many respects they were unsuited to modern

conditions and environment; they bear no hint in their sculptured adornment of our country's history or life, and are thus devoid of one of the most vital and essential elements of good architecture.

It has been suggested that ornament is not architecture, but a very subordinate and non-essential part of it. On the other hand, Mr. Ruskin has said that structures without beautiful adornment are mere buildings and not architecture. The truth may lie between the two, but it is certain that the best architecture has always been intimately allied with sculpture, which invariably lent it its most vivid and living interest.

Apart from the more important buildings of the earlier half of the century, much cannot be said in favour of the domestic and more common buildings of these years. Stucco was predominant; it hid a multitude of sins, and, compared with the better built and simpler style of the domestic and cottage architecture of the last and earlier centuries, there was nothing to boast of. The Gothic style was used in ecclesiastical work concurrently with the Classic for secular purposes, but mainly of a late or Perpendicular period, and producing a cast-iron effect, rather than exemplifying the spirit of good mediæval examples.

Then came a different phase in the architectural thought of the century, which was almost the death blow to the Classic revival. There were many elements at work which produced the awakening of interest in mediæval art, and caused Classic to be almost superseded by Gothic architecture, at any rate for a time.

The discovery of steam as a motive power, for one thing, had caused a great influx of wealth and ease of travelling, resulting in a wider knowledge of the architecture of other countries, and of past styles.

No modern movement has been more influenced by literature than the Gothic revival. Horace Walpole may have been a fribble, but he had a firm though uninstructed faith in Gothic. Beckford, the author of *Vathek*, spent much money on what he conceived to be mediæval art, while Sir Walter Scott both built and wrote Gothic as he knew it.

Then about 1835 Pugin published his *Contrasts*, a vivacious and most sarcastic criticism on Pagan methods of architecture compared with mediæval or "Christian." In 1841 his *Apology for the Revival of Christian Architecture* was published, and other works followed, full of ardent enthusiasm for the resuscitation of severe mediævalism, particularly in reference to ecclesiastical structures. Mr. Ruskin's writings also not only greatly influenced architects, but their religious tone appealed to the public. At first, though, they were too strong meat for babes, as was shown in much Gothic work done shortly after. For example, owing to some remarks of his as to the outlines of the openings of traceried windows being more important than the details of the moulded stonework, the very coarsest plate tracery was erected, I suppose in exemplification of this truth, and for the economy in labour in refined mouldings. He powerfully pointed out the beauties of Gothic work, and urged the necessity for the living interest of good and meaning sculpture in noble architecture.

The publication of other works on mediæval art and architecture by Rickman, Pugin and Le Keux, Scott, Parker, the Ecclesiological Society, Nesfield, Street, Shaw, Butterfield, Burges and others, also Viollet-le-Duc's *Dictionnaire Raisonné*, with its magnificent analysis of the scientific construction of Gothic work, put this style in an altogether new and entertaining light before the student. The last-mentioned publication increased the attraction of thoughtful men to the beauty, science, and detail of the Gothic styles. I can well remember whilst a pupil with Burges the intense excitement caused by the arrival of each fresh part of this work. Added to this the Oxford Movement and the societies it gave rise to for the resuscitation of disused ecclesiastical forms and ritual caused the study of ancient Church architecture and arrangement to be taken up by the rising clergy and others at the Universities, who hence-

forth were careful to go to the most capable architects of the Gothic school. This movement also provoked greater enthusiasm amongst the architects themselves.

Then ensued the battle of the styles. The ardent enthusiasm of the Gothic men for a revival of mediæval art and architecture, which blinded them to the beauties of Classic, and the persistent denunciation of the severe classicists who could see no merits in Gothic, gave good grounds for the vigorous diversion of opinion which raged during the middle years of this century. Gradually, however, the Gothic school seemed to gain an ascendancy, which lasted until the seventies. There were, however, architects practising in both Classic and Gothic, according to the tastes of their clients. Wilkins practised in both styles, and the best work the Italian Barry produced was perhaps our Gothic Houses of Parliament. At first the early thirteenth and fourteenth century English work was the admiration of these Gothic partisans; then Viollet-le-Duc's works brought early French into fashion, as being larger and grander in effect. Later on, entire satisfaction not being derived from these (they were, I suppose, too simple and pure for the complicated environment of our many-sided lives), Decorated and Jacobean each had their turn. Amongst the leaders of this Gothic awakening, Pugin, Scott and Moffat, Pritchard, Paley, Butterfield, Street, Burges, Godwin, Pearson, and I may now add Sir Arthur Blomfield, were the most prominent; and there are others, some of whom are still alive, whose names are mainly identified with ecclesiastical buildings. I cannot here name examples of the works of all these men, and the best of them are known, I suppose, to most of us.

It was in the forties that Pugin built his own house and church at Ramsgate, the only work, I believe, he said he ever really enjoyed doing, and this because he was unhampered by a client. A little later he rebuilt Alton Towers for the Earl of Shrewsbury, and St. John's Hospital, Alton. He also erected or restored some forty or more churches and cathedrals, and some twenty conventual and a number of domestic buildings. But the work which perhaps added most to his fame was the assistance he rendered in the working out of the intricate and refined details of Sir Charles Barry's sumptuous design for the Houses of Parliament. To my mind it is a fine combination, classical in its symmetry and horizontality, and Gothic in its picturesque outline and detail. In many respects it is the most notable building erected in England during this century, and to many it must be a matter of congratulation that our great Houses of Parliament should have been designed in a national English style of architecture, rather than in the more monumental Classic. At any rate, whatever our views as to style may be, it stands as one of the most complete and best buildings of modern Europe.

Of the men of this period, Sir Gilbert Scott stands out pre-eminent, not so much, perhaps, on account of any very particular individuality or extraordinary excellence in his works—though at the time they were extraordinary—as from the great part he played in the revival of this period, his enthusiastic zeal, and the establishment of what one might almost call a school of Gothic architecture, caused by the enormous number of works carried out by him in the erection and restoration of churches and cathedrals, and the training a staff or school of young men sufficient for the purposes of his enormous practice.

But for the overbearing attitude of Lord Palmerston, we might have had from Sir Gilbert Scott in the Foreign and Colonial Offices a building which would have been as grand a success as the Houses of Parliament.

However critically we may examine, at the present day, the works of these great men, we must always remember that the advantages of our time in easy travel, access to architectural libraries, and the multiplicity of illustrated works on all branches of architecture now open to us, and the enormous increase during the last fifty years of archaeological works, were not possessed by them. They were not smothered by learning as we are; they had

to find out for themselves that which we can learn easily from others ; and, with more limited knowledge than the student of these days *ought* to possess, they worked energetically and earnestly for the resuscitation of our indigenous style of architecture. Further, however much the methods adopted for the preservation of our national monuments may be cavilled at—and criticism is often captious—had it not been for the men of this period many of these buildings would have been, by this time, well on the road to irretrievable ruin. To them, therefore, members of this Institute, and men who gave much time and thought to its working, not only our gratitude, but that of the nation, is due.

In some respects, perhaps, William Burges was the most original of the purist school of Gothic architects of this revival period, and the most deeply imbued with the mediæval spirit and the most familiar with its art and craftsmanship. He also insisted that architecture was not worthy of the name if it did not tell some tale, historic, poetic, or otherwise. He also urged a point which seems to have been lost sight of in these later years—namely, that all architects should learn to draw the human figure, and design their own sculpture—at least as to grouping and arrangement. His competitive design for the Law Courts, if not the best, was certainly the most monumental and notable of the Gothic ones submitted. His work at Cardiff for the Marquis of Bute, and in his own house in Kensington, in Cork Cathedral and Studley Royal and Ripon Churches, shows a genius for the invention of interesting and beautiful detail in the true mediæval spirit that no other architect of this age has approached.

Street's works also are so well known to you all that to mention more than one or two would be waste of time. He was one of those who saw that ecclesiastical architecture should meet also the requirements of modern times—that large churches should be adapted for congregational purposes ; and it is instructive to note his endeavours to connect a wide nave with a narrow choir—not always successfully, as at Bournemouth, where he canted the eastern-most bays of the nave inwards, causing a pinched effect just where an open and spacious area seems to be demanded. His works, whether ecclesiastical, public, or private, were always interesting from the vigorous personality impressed upon them, and this was always apparent in his early works, as in the church at Garden Street, Westminster, in the later and much more refined one at Vassall Road, Kennington, in the house he erected for himself at Holmby St. Mary, the mansion in Cadogan Square, and in the Law Courts, which was the last great effort of his life. These Law Courts unfortunately seem to have given the death blow to Gothic. It was not the fault of the architect so much as that of the Building Committee, who seem to have been determined to have a large Central Hall. Accordingly designs without this feature were discarded, notwithstanding that this waste of space, useless also as a *foyer* to the Courts, deprived the building—to which an insufficient site had been appropriated—of the last chance of obtaining light and air to the corridors. The plan of this building may not be all that could be desired, but that is hardly the fault of the style of architecture, though from this fact it has been argued that Gothic is unsuited to modern requirements.

Of the other notable figures in this revival of mediæval architecture I will only mention one. All were working for the same end, though often on slightly different lines and with varied success as to the quality of their work.

In referring to the late Mr. Pearson I will only mention his last and, I suppose, his best and most beautiful work—namely, Truro Cathedral—and simply to point out what was certainly one of the failings in the methods of the Gothic revival. Truro is a modern cathedral intended to serve modern needs, but it appears to have been designed with a view to reproducing a mediæval church, whose plan was originated to meet requirements of other ages—entirely different from those of to-day.

There can be no doubt that for congregational purposes in these days, and for worship in which all can join, a central tower on piers blocking up the best part of the internal area is a sad mistake, and inexcusable unless a particular object of our church building is to erect in plan and detail mediæval structures that in future ages may deceive the inquiring archæologist. This was not the spirit of the men of the Italian Renaissance. But it is useless to attempt to specify the characteristics or buildings of each of the notable men of this Gothic revival period; their best works are known to us all. However adversely faddism or conceit may criticise many of them, it cannot but be felt that they greatly redound to the credit of the architects of this period, and also add the greatest interest to the history of the architecture of the century.

Since the seventies hot enthusiasm for a resuscitation of any definite style of Gothic seems to have smouldered and died, and to have been succeeded by a period of flirtation with pretty well all styles of architecture. Byzantine, Moorish, Romanesque, Queen Anne, Dutch, French Renaissance, and even Egyptian have each had their admirers. The plain and severe, the rococo and ugly, the picturesque and grotesque have all been tried—all being the result of the study or copyism of debased deductions from those original styles which inspired the greater Classic and Gothic architects of the second and third quarters of this century.

The study of the purest examples of art must be the best tuition; if we endeavour to emulate the debased, our work will be on a still lower grade:

“Noble souls
Still find the base is hurtful, and the good
Is full of glory.”

I have heard of an architect saying he adored drawing a piece of impure detail, and of another that he delighted in designing something that would give a shock, and I think their works prove the truth of their remarks. Such sentiments, however, can arise only from an ill-regulated fancy or from a vulgar desire to attract attention, and cannot lead to great results. The overloading of detail and ornamentation is, again, another phase of a similar feeling. Many of the so-called adornments of modern buildings are not only not indispensable, but positively detrimental to the dignity of architecture. Nevertheless, these later years have been marked by a keen study and most enthusiastic interest in, and desire for, the good and beautiful in architecture, with an earnest attention and effort to discover the right adaptation of known (and shall I add sometimes unknown?) architectural forms to the manifold and complicated requirements of the time.

In looking back, then, generally at the architectural work of the century, what evidence is there of there having been, or being, any revival of architecture in any way similar to those of past periods? Sir Gilbert Scott once said in these rooms, in reference to the earnest enthusiasm of the middle of the century for a resuscitation of our English Gothic architecture, that no parallel to it had occurred since the Italian Renaissance, and I believe he was right; and further, I believe that we are at the present moment in course of an evolution in art that may in time result in a uniform national style. And for the following reasons:

During this century there seem to have been three fairly distinctive periods. In the first the Classic style was zealously cultivated; in the second the resuscitation of Gothic was passionately preached; in the third, no one style has predominated, but there has been a restless searching and craving for something that shall satisfy the conditions and requirements of modern life.

In the first period, though classic teaching led to the study of, and desire for a revival of, the antique, it was differentiated from the movement in Italy of the fifteenth century by

so many of our architects subordinating modern requirements to a clothing of ancient examples reproduced for the purpose rather than designing in ancient methods with an individualistic treatment suitable to the occasion. This arrested true progress. It therefore failed in altogether impressing the nation with its suitability for English nineteenth-century architecture. Nevertheless, there was in the movement a zeal for stately and noble work, and it was this desire which caused the founding of the Royal Institute of British Architects as one means for the attainment of the end.

The second period, with its thirst for knowledge and culture and facilities for education, certainly evinced a similar feeling to that which found expression in the Humanists of the fourteenth century in their insistence on scholarship and culture being necessary for the elevation of mankind.

In their case it was apart from, rather than in conjunction with, theological teaching; while in this century, notwithstanding the broad views and freethinking tendencies of the age, it has been side by side with a distinctive religious awakening, which started and then kept alive the interest and desire for a revival of mediæval art, under the plea that it alone was Christian.

This mid-century Gothic movement began with ecclesiastical architecture, and extended itself to civil work. But it failed, as did the Classic movement, in establishing itself as a recognised national method or style, and also for somewhat similar reasons.

A slavish copyism was engendered by reason of the scorn cast by the purists on detail inexact in its reproduction. To this school it seemed of more importance that every portion and detail of a modern Gothic building should have its precedent in the Middle Ages than that, as a building, it should exactly meet modern needs.

This arrested individualism and thoughtful adaptation of the mediæval methods to our complicated modern wants. It was exactly (with some exceptions) the reverse of the principle which actuated the sculptor-architects of the Italian Renaissance. They adopted antique methods and details, and with original ingenuity pressed them into subserving their plans, not permitting them to dominate the requirements of the time. Nevertheless there was in this Gothic movement the evidence of life and a distinctive and ardent striving after more architectural light, and a national general style; and this feeling was fostered and kept alive by men who were members of this Institute.

England owes much to the men who led our Classic and Gothic schools, and one cannot but feel that Fergusson's severe criticisms on their works are harsh and unjust. From his remarks it might be supposed that they used no brain power whatever, but simply copied, nor cared to do more than copy. He argues as if it were to be expected that a perfect style suitable to all our complex modern life could have been attained at one jump. We know that long periods, centuries even, are required for such an evolution. He seems to have thought that their first efforts should have reached the highest levels. A more reasonable view is that the copyism he denounces was but the first step in a legitimate process of development. Both by the Classic and Gothic purists of this country that step was honestly taken.

In this the third distinctive period of the century we see architects abandoning purism, and betaking themselves to an eclectic treatment of the two great branches of style. May we not hope that along this line a national architecture may eventually be reached, at once good in an artistic sense, and flexible and useful from a practical point of view?

An analogous phase was gone through in the early Renaissance. Should this happen, I venture to think it will be found that the R.I.B.A. has contributed to it in no small degree. For the leaders of the movements I have indicated were members of our body, and we may justly congratulate ourselves on the steps we are taking to foster emulation of such excellent

examples, for the careful and wide study of the rising generation of architects is fostered by it, and their keen interest is proved by the splendid results shown in the work produced under the incentives offered by the Institute in the presentation of medals, prizes, and travelling studentships for design, draughtsmanship, and for architectural research.

Personally, I have a strong conviction that the evolution of a sound architectural style must be accompanied by a development of the neglected art of architectural sculpture. At all the best periods of architectural development the sculptured adornments of the buildings (except where religion forbade, as amongst the Mahomedans) told their history. Have we, with our enormous Empire, nothing to record? Or is it owing to inability, indifference, or parsimony, that our life and history find no place in our architecture? Or does the crushing weight of the utilitarian element overwhelm artistic effort?

Our Houses of Parliament have some forty or fifty statues of kings, &c.; the sculptured subjects suggested in Scott's Foreign Office design and Street's Law Courts were pruned away by the Government. Our huge railway stations and commercial and domestic buildings show nothing but meaningless ornament. Will our new Public Offices illustrate in any way the growth of Her Imperial Majesty's dominions? Or is the country too poor or too indifferent to give our sculptors such a chance? Is it not impolitic of a Government in these discontented days to discourage the development of a craft the highest in art, which elevates public spirit, gives employment to a large class of the most intelligent workers, and at the same time raises the standard of architecture, and enhances the glory of a country?

I learn that Frankfort has lately started a fund, the income from which is to be spent in the adornment of the town with sculpture. This shows the increasing feeling there is in the cultivated world for such a step. Why cannot we do likewise?

However, sculpture is a detail of refinement and adornment, which, if architects would suggest it properly and wisely, might possibly more often find place in our buildings. But aid from sources external to architects is needed in other ways if a national architecture is ever to be arrived at.

London seems practically in process of rebuilding in its main centres, and constant enlargement is taking place in the suburbs. Surely steps should be taken to prevent our new streets being eyesores instead of improvements, and to avoid the repetition of such a medley of incongruities and commonplaces as may be found in Shaftesbury Avenue and Charing Cross Road. Architectural opportunities in these streets were afforded which, under proper control, might have had a magnificent result. Surely there should be some controlling power to settle the general lines, heights, and materials of buildings and style of design.

That the London County Council has something to say as to construction and heights is true, but their purely practical conditions being complied with, any one can build according as his own sweet will, taste, or ignorance may prompt. This cannot be the right method in a great Empire for the fostering of a national art like architecture.

Every man who builds in a public street has a duty to the public to perform. His building should not endanger the safety of the public, but neither should it be a shock to their sensibilities. Proper control should render it impossible for us to see such a thing as I noticed the other day—a dull red-brick Renaissance house on one side of a bright glazed teapot ware pseudo-Gothic building, and a stone nondescript erection on the other—of different heights, horizontality and materials; while close by was another huge stone façade with heavy projecting columns and pediments, constructed surface ornament, standing apparently on nothing but sheets of plate-glass. Can anything be worse? Notwithstanding the modern shopman's requirements, architects should resolutely set their faces against such hideous uglinesses.

In indifferent matters each man should have liberty of taste, if the indulgence thereof

injures neither himself nor others. Individualism is needed in art, but if the imagination or individuality be only a mark of undisciplined self and an offence to art, it is positively injurious in its demoralisation of public taste, and should be restrained. Were there a Ministry of Fine Arts, with a committee of control under a chief whose qualifications were not *only* political, surely something might be done.

The committee who were responsible for the Chicago Exhibition—a work which was magnificent in its effect, as all who saw it were agreed—was composed of architects and sculptors, who were charged with the erection and adornment of the numerous palaces. This committee settled the general style of buildings to be erected, the heights of cornices, floors, &c.; and each design was submitted to the criticism of the whole committee, who passed it, or suggested improvements, which the architect was forced to consider. The result was grand and stately, such as those who did not see it can hardly realise. I only mention this to show what can be done by intelligent control, and I do not think we are behind our American cousins in either intelligence or capacity for design.

The Ministry of Fine Arts in Paris has such a controlling voice in all matters of public works, in laying out the streets or boulevards, in the erection of public monuments, and even in their bridges. In France it is entirely out of the power of any one to erect unsightly edifices in prominent positions to the annoyance of the artistic sense of the nation.

There is another thing that also affects our architectural design. We are always, in these days of greedy competition, in too great a hurry and rush. Art is long, and sufficient time for thought and quiet for solitary reflection are not afforded the busy architects of the day to solve properly the problems set before them. Designs for half a million's worth of building have to be prepared, submitted, and passed probably in, say, three months, and then the unfortunate architect is told that his designs are not equal to those of past ages.

Ralph Waldo Emerson says, "We do not get enough of solitude, with the result that our minds are in danger of being vulgarised and of being unable to see things in their proper proportion." This is exactly what frequently happens to the architect of to-day: he does not get enough quiet for meditation.

Let us hope that next century our architects, with their increasing wisdom, which will enforce periods of rest for reflection and mental recuperation, and with higher cultivation which will improve taste, and under wiser auspices which, with an imperial spirit, will exercise an enlightened control, may develop a true style, sufficient for modern requirements and satisfying to æstheticism.

As this goal cannot be reached by architects working on different methods and lines, and competing to outdo each other by differences or eccentricities of style, let us hope we may, in a glorious enthusiasm for our art, be led to sink personal predilections in combined efforts to seek the true artistic adaptation of our architecture to modern needs, and that such efforts may in time elucidate a style suited to the twentieth century, which, while allowing of individualism in the treatment of details, may have a general harmony and at last eventuate in a distinctive national architecture, stately, dignified, and picturesque; an architecture that may enhance the glory of this great empire, and be a proof that the British nation is neither sordid nor penurious, but in its highest state of civilisation may become capable of emulating the best art history of past ages.

VOTE OF THANKS TO THE PRESIDENT.

MR. J. MACVICAR ANDERSON, F.R.S.E.,
Past-President:

Mr. President, Ladies, and Gentlemen: It is with great pleasure that I avail myself of the pri-

vilege of proposing a formal vote of thanks to you, Sir, for the Address that you have just delivered, and to which we have had the pleasure of listening. For two reasons I am glad to exercise

this privilege. In the first place, because it affords me an opportunity of offering to you, Sir, on my own behalf, and I think I may say also on behalf of the Royal Institute of British Architects, hearty congratulations upon your occupying the Presidential Chair of the Institute. Knowing, as I well do from experience, what are the duties, the responsibilities, the anxieties, the cares, and also the pleasures and honours of the distinguished position which you now occupy, I am fully persuaded that you will discharge those duties not only in a manner creditable to yourself, but in one that will conduce to the best and highest interests of the Institute, as well as the profession of Architecture. And secondly, Sir, I am glad of the opportunity of availing myself of the privilege of proposing this motion, because I can honestly congratulate you upon your first Presidential Address. I regard it as no ordinary or commonplace composition: I look upon it as a masterly review of the architecture of the past century, exhibiting great research, full of breadth of thought, suggestive thought, and entirely free from any illiberal or merely sectarian opinions. I therefore, Sir, congratulate you heartily upon the Address.

I venture to make one word only of criticism, and I do so the more boldly because I feel quite sure that it will meet with your entire concurrence. In your opening remarks you referred to the membership of the Institute, and you drew a distinction between Metropolitan members and provincial members, referring to the latter with satisfaction as pointing to the character of the Institute being not merely Metropolitan but National. So far I am entirely with you, but I think you did not go far enough. In these days, when what was merely some years since National is now absorbed in what is Imperial; in these days, when with splendid enthusiasm and loyalty our Colonial brethren have come forward voluntarily and have offered valuable military aid to the old country in her difficulties—in these days, Sir, I think it ought to be with some pride and satisfaction that we reflect that out of the 770 members whom you described as provincial there are no fewer than seventy-eight who are practising in the Colonies and are members of the Greater Britain.

One other point I should like to refer to briefly, although it does not find a place in your Address, that is, the financial condition of the Institute. When I had the honour of occupying the position you now hold our condition in that respect was not altogether satisfactory. We had spent large sums upon these premises, and our publications had become somewhat more expensive than we were justified in making them. Now the financial position is much more hopeful. In the last three years you have declared a surplus. In 1896 you had a surplus of £591; in 1897 of £1,116; and last year, 1898, of £1,241. Now,

Sir, I refer to this point simply for this reason: that I hope the Council will realise that it does not necessarily follow that because you have a surplus you need spend it. I am one of those who have always maintained that this Institute ought to have a more worthy home than we now possess, and I hope to live to see the day when the Institute will be more suitably located. But let us not be in too great a hurry. Let us take full return for the money we have spent upon these premises, and then, after waiting patiently a few years, having accumulated a surplus of, say, £20,000 or £30,000, let us find, or better still, build, a worthy home for the Institute. You will pardon me, I hope, for offering this word of advice—I have not many opportunities of doing so.

Sir, your Address consisted principally of a very masterly review of the architecture and the architects of the century which is now about to close and pass into history. I do not propose to follow you in the details of that review, because to do so would simply be traversing the ground in much less happy phraseology than that in which you have already passed over it. But let us take for one moment a glance at the future. London is continuing to expand with enormous strides. I have known it now for nearly fifty years, I am sorry to say, and we might have expected the enormous advances that have been made on previous years to have indicated some signs of stopping. But such is not the case; our suburbs are being extended with continual and amazing rapidity. Where is this to end? Who can say? But of this I am satisfied, that in proportion as Greater London continues to expand and extend, Central London becomes more and more congested and more and more unfit for the work it has to do. Now in the coming century it is to me almost a certainty that the principal thoroughfares of Central London must of necessity be widened and enlarged. Great opportunities will thus be extended to the architects of the day. Will these be properly and worthily taken advantage of? Sir, I turn to your Address partly for an answer. In one passage you say: "The study of the purest examples of art or architecture must be the best tuition," and I heartily concur; but a little later you say: "In this third distinctive period" (that is to say, the day in which we now live) "we see architects abandoning purism, and betaking themselves to an eclectic treatment of the two great branches of style." That, in my humble opinion, Sir, is not so encouraging as your first observation, as I think all true architecture is based on purism. You have very fitly and happily expressed the state of architecture in what you described as the third distinctive period of the century. The expression to which I allude is "a period of flirtation." I think, Sir, you might have gone very far without finding three words which would have so

fitly expressed what we see passing around us. The ways of flirtation we know are not always to be commended. It is true that an innocent flirtation with a pure-minded girl has charms of gladness and sweetness which possibly some of those who listen to me may have experienced; but such are not always the ways of flirtation; and we cannot be surprised, I think, that the staid classicist, the stern mediaevalist, or the chaste purist should find any difficulty in condemning much of the work of the present day. But, Sir, you have taken an optimistic view of this question, and you look forward to good being educed even out of evil; you look forward to a distinctive national architecture being evolved from this third period of the history of the century. I can only hope that results will justify your optimistic opinion. I am far from condemning all the work of the present day—there is much that is valuable, much to be admired; and therefore I join hands with you in looking optimistically upon the future. No doubt when these days of flirtation have passed by, as they are bound to do in the nature of things, and when Dame Architecture has settled down to the serious and responsible work of the twentieth century, we may hope that her progeny will produce works of such dignity, purity, and simplicity as may be worthy of the name of national architecture.

One other point, Sir, you referred to, and that was the desirability or otherwise of establishing some official control over the architecture of the day. Now, if it were to consist merely in the political appointment of a Cabinet Minister, whose term of office would expire on a change of Government, I cannot see that it would lead to any good whatever. If, on the other hand, we were to have a Minister of Fine Arts, a permanent official, appointed purely for his knowledge of and familiarity with the arts, then I think that good might come out of it; and that I hope we may some day look forward to see. Sir, in the hope that your views will find expression in the twentieth century, I will conclude by proposing a most hearty vote of thanks to you for the interesting and suggestive Address which you have delivered.

Mr. JOSEPH SMITH [F], President of the Sheffield Society of Architects, said: Mr. President, Ladies, and Gentlemen, I have been asked to briefly second the Resolution which has just been so ably and felicitously proposed, and I have the greatest pleasure in doing so, for various reasons. First of all, the President has very graciously honoured us in Sheffield lately by attending our Annual Dinner, on which occasion he delivered to us a very interesting and instructive address. I have, therefore, on behalf of the Sheffield Society and the other Allied Societies very great pleasure in seconding this proposal. And, secondly, I have pleasure in seconding it on account of the reference that has been made by

the President to the statistics of membership among the provincial architects. It is a fact which I think the Institute will do well to consider and to appraise at its proper value, that you have a membership from the provinces amounting to 48 per cent. of the total. Over 50 per cent. of the Fellows are found in the provinces, and about 45 per cent. of the Associate members. And you have only just tapped that resource. If the Institute will lay itself out to be of greater practical value to provincial architects, as well as to Metropolitan architects, you will find much larger accessions of membership than you have had in the past from the provinces. There are scores of architects in our larger provincial towns who do not consider the Institute to have rendered any great service to the architectural profession; but that impression is gradually dying away, and since you have laid yourselves out to ally provincial societies with the Metropolitan body, the Institute has risen in the esteem of provincial practitioners. The junior members also in the provinces are aspiring in a greater degree than in the past to become connected with the Royal Institute. I congratulate the President upon his very able and interesting Address; it has been, as the Mover of the Resolution remarked, a masterly review of the architecture and architects during this century. With regard to the development of a national style, our ideals in that direction can only be realised by honestly and seriously working out the problems which come to us day by day. The meeting of the requirements for which we build, and the clothing of the architecture which we design to meet those requirements in the most artistic and pleasing form that we can possibly invent or design, is the way, I think, to come eventually to anything like a definite national style. If the Royal Institute, which has the advancement of architecture as its highest aim, will try, in the educational efforts that it makes for young people, to lead them into this line of study, and infuse them with a desire to meet the problems of the day in the very best artistic manner, I think that will be one of the best means of bringing about a national style. The President in his Address has given very clear and powerful evidence that the fears which he expressed in its opening paragraph that he would not be able to worthily sustain the work of his predecessors in character and dignity are groundless. I follow him in all his aspirations, and with him look forward to the happy evolution of a national style of architecture. I have much pleasure in seconding the proposition.

Mr. F. C. PENROSE, F.R.S., D.Litt., D.C.L., *Past President*, supporting the Resolution, said he heartily followed the previous speakers, and thanked the President, in the name of all present, for his most interesting and valuable Address.

FOUNDATIONS OF BUILDINGS.*

By S. ANGLIN,

Master of Engineering, Royal University of Ireland.

IN recent years the field of operations of the architect has been considerably enlarged by the introduction of steel and iron work in the construction of buildings, and what was formerly considered to be exclusively the business of the civil engineer is becoming more the work of the architect. A knowledge, therefore, of the nature and properties of steel and iron and the methods of calculating the strengths of the various members of such structures is becoming more essential every day to the architect. It is not proposed in this Paper to deal with the arranging and designing of such structures—this of itself would supply material for more than one Paper—but rather to make a few remarks on the superstructure or foundations of such buildings, and, indeed, of buildings in general.

In ordinary buildings constructed of stone or brick walls, the pressure on the foundations is pretty evenly distributed over a comparatively large area of ground surface; so that pressure per square foot on the foundations is usually small, and does not call for any special consideration, except when the ground is soft or treacherous. In the case of lofty buildings of enormous weight supported on pillars the case, however, is quite different. In such buildings as much as 1,000 tons may come on the foundations of a single pillar; this immense pressure being exerted on a comparatively small area of ground surface, it will be apparent that special means will have to be adopted for insuring the stability of such foundations.

My attention was forcibly drawn to the importance of this subject, and to the scant thought it sometimes receives by the architect, about four years ago, when I was asked to report on the causes of the collapse of a large mill then in course of construction in Germany. This was a typical Lancashire cotton mill of several stories, the floors being for the most part supported on cast-iron pillars. These pillars rested on brick piers, underneath which were beds of concrete, the concrete itself resting on a sand foundation. Partly owing to the presence of water in the sand, partly owing to inferior bricks and mortar and the slovenly manner in which the work was executed, and perhaps, also, partly owing to the defective cast-iron base plates on which the pillars rested, one day, when the construction of the mill was nearing completion, the foundations of one or more of the pillars subsided, causing the

base plates to fracture, and the shafts of the pillars to pierce through the brickwork and concrete beneath. This occasioned the complete wreck of the structure, and entailed the loss of the lives of several of the workmen. Here we have an example of a building carefully designed and erected so far as its superstructure was concerned, but, owing to carelessness in the designing and execution of the foundations, meeting with an untimely fate.

In America the construction of lofty steel and iron buildings is carried to much greater lengths than in this country. The erection of what are termed "sky scrapers" seems to have originated in Chicago, and from there has spread to several other cities in the States, and it is not at all improbable that in the near future we shall see their introduction into England.

There may be many objections to these colossal structures from an æsthetic point of view, and I dare say many people consider them monstrous eyesores. There may be also objections to them as excluding light and air; yet, when we admit all this, we cannot but admire the ingenuity displayed in their construction, and from a commercial point of view we must admit their claims, especially in cities where land is very valuable. Such being the case, we should face the situation boldly, and, instead of decrying them as monstrosities, should rather study them and make ourselves conversant with all the intricacies of their design.

In America, the work of designing these structures is usually divided between the engineer and architect. The details of their construction are so varied that neither the engineer nor the architect by himself can satisfactorily cope with them. The work of the engineer consists in designing the steel framework, including the pillars and girders; that of the architect in arranging the plan of the rooms and offices and the skeleton walls and partitions, and also the general decorations; while the foundations, which are of the utmost importance, might be planned conjointly by both. In providing for these, the loads coming on the foundations must first be carefully calculated. These consist of, first, the dead weight of the building itself, including that of the floors and roof; and, secondly, the loads on the floors, which may consist of goods, machinery, and people, and also the wind pressure exerted on the building. These latter loads may change from time to time, and are sometimes termed live or accidental loads, and they vary considerably in different buildings.

* A Paper read before the Manchester Society of Architects, October 12, 1899.

The maximum live loads on the floors of dwellings may be taken as $1\frac{1}{2}$ cwt. per square foot; on public buildings at $1\frac{1}{2}$ cwt. per square foot; and on warehouses at from $1\frac{1}{2}$ to 3 cwt. per square foot. In the case of dwelling-houses and public buildings it scarcely seems probable that these loads can be reached, but it is always advisable to have a margin. It is quite possible that such floors may contain a densely packed crowd of people, which may weigh as much as 1 cwt. per square foot of floor surface. In the case of lofty structures consisting mainly of offices with light fixed furniture it is not necessary to allow for such heavy loads as those specified. The weight of the roof, including wind pressure and snow, depends on the span, and varies between 25 and 65 lb. per square foot of roof surface.

A lofty steel structure has just been completed in New York, and it may be of interest to refer to a few particulars respecting it.

This is the Park Row building, mainly consisting of offices. It is the highest building in the world, its height from the level of the kerb in Park Row to the top of the cupola being 386 feet. It has thirty-two stories, and contains 1,000 offices, having accommodation for 4,000 persons. The total weight of the building is estimated at 65,000 tons, and the pressure on some of the pillar foundations is as much as 1,100 tons.

The structure is carried on round timber piles of spruce from 10 to 14 inches in diameter, driven into a sand foundation to a depth of about 20 feet. The piles are placed from 16 to 18 inches apart, centre to centre, and are driven in rows, the distance between each row being about 24 inches—centres. The load on each pile does not exceed 16 tons. The heads of the piles were cut off level, and concrete was filled in between them to a depth of 12 to 16 inches, the surface of the concrete being level with the tops of the piles. Upon the concrete are laid granite blocks which receive brick piers, which in their turn receive the grillage beams and distributing girders. Some of the interior pillars rest directly on the grillage beams, which are steel-rolled joists. In other cases distributing girders rest on the grillage beams of two or more of the foundations, and support two or three pillars. These distributing girders are massive steel riveted girders of the box form, and vary in length from 20 to 47 feet, and in depth from 6 to 8 feet, and some of them weigh as much as 47 tons.

This example of a building is, of course, an extreme case, and the architect may never be called upon to consider such enormous loads and such intricate foundations; yet the general principles coming into operation here are, in a modified way, applicable to similar buildings of less pretensions.

Having said so much in a general way, we will now consider more in detail as to what constitutes

a good foundation, and what working loads different foundations are capable of sustaining. I would, however, remark that within the scope of a brief Paper, hastily written, it is not claimed that anything in the nature of a complete survey of the question can be attempted.

In preparing a foundation the first thing to be done is to examine the nature of the ground on which the building is to be erected. It is not often that the surface of the ground is suitable for building upon. If it is of rock, of course we have all that is necessary so far as stability is concerned. It is the exception, and not the rule, however, that a rocky foundation is to be met with. It then becomes necessary to excavate until a reliable foundation is reached. As to what constitutes a reliable substratum is a matter very largely the result of practical experience.

Ordinary foundations may be ranged under three classes, viz.:

1. Foundations in rock, or in some material whose stability is not affected by water.
2. Foundations in firm earth, under which are included such materials as sand, gravel, and hard clay.
3. Foundations in soft earth.

It must be borne in mind that the base of every foundation should be as nearly as possible perpendicular to the direction of the pressure which it has to sustain; and, moreover, it must be of sufficient area to bear that pressure with safety.

To prepare a rock foundation for being built upon it will be necessary:—(1) To cut away all loose and decayed parts of the rock; (2) to cut and dress the rock to a plane surface, or to a set of plane surfaces like those of steps, perpendicular to the direction of the pressure; (3) to fill, where necessary, hollows in the rock with concrete or rubble masonry; or it may be advisable, in order to distribute the pressure, to cover the surface of the rock with a layer of concrete varying in thickness from a few inches to several feet.

The crushing strength of rock varies considerably. That of chalk, if we may consider chalk a rock, is as low as 30 tons per square foot. The crushing strengths of different kinds of sandstone vary between 140 and 450 tons per square foot, that of limestone about 500 tons per square foot, while that of granite or basalt is as high as 1,000 tons per square foot.

The intensity of the working pressure on a rock foundation should in no case exceed one-tenth of the pressure which would crush it. It is not often in practice, however, that the actual pressure on a rock, or indeed any foundation, approaches this limit. Speaking generally, the average pressure coming on a fairly good quality of rock is about 10 tons per square foot in work which has been executed; and the architect might fix in his mind anything up to 20 tons as a safe rule to go upon.

On weak sandstone which is so soft that it crumbles in the hand 2 tons is sufficient to allow.

Having said so much on rock foundations I will pass on to the consideration of foundations laid on *firm earth*, under which head may be included hard clay, clean dry gravel, and clean sharp sand. For buildings resting on such foundations it is desirable, in this country, that the foundations should be carried at least 3 feet below the surface of the ground for sand or gravel, and 4 feet for clay, in order that they may not be weakened by the disintegrating effects of frost or other climatic conditions. In other countries where greater extremes of climate are experienced a greater depth is necessary. The practice in Germany, for example, I understand, is that for foundations of this kind the depth should be from 4 to 5 feet, and in North America from 4 to 6 feet.

It is very desirable that surface water should be kept from such foundations by constructing suitable drains.

Different authorities vary very much in their estimates as to what working pressure it is desirable to place on this class of foundations. The German authorities recognise 2·5 tons per square foot as a suitable pressure. With good clay, however, sufficiently beneath the surface of the ground to be protected from atmospheric influences, much higher pressures can be safely applied. The main piers of the Tower Bridge in London rest on clay, on which they exert a pressure of 1 tons per square foot. At Openshaw, near Manchester, the massive steel pillars of Messrs. Sir W. G. Armstrong, Whitworth & Co.'s works, which are subject to vibratory loads from passing cranes, exert in some cases a pressure of as much as 5 tons per square foot on the clay, and no settlement has been observed. In other buildings, no doubt, greater pressures exist; but this is the limit so far as my experience goes. In the great majority of structures built on clay the pressure is much less. That of the Nelson Column, in Trafalgar Square, London, does not exceed 1·3 ton per square foot. This column rests on clay of great depth and compactness. In preparing this foundation an excavation of 60 feet square and 12 feet deep was made and filled with concrete to a depth of 6 feet; on this base a frustum of a pyramid 13 feet high was built in brickwork, on which the superstructure was erected. On a base 60 feet square, which may be taken as the real base of active support, the gross load amounts to 4,665 tons, equivalent to 1·3 ton per square foot, as already stated. I think I may say that three times this load could with safety be placed on this foundation.

Foundations in gravel and sand, under favourable circumstances, are capable of bearing heavy loads. The Campanile of Cremona, 395 feet high, standing on Pliocene gravel, bears with a pressure of 12 tons per square foot on its base.

It is not often that water is injurious to a gravel foundation, as it can percolate through

freely; but with sand the case is quite different, as water so alters this material as to make it quite useless for a foundation. The obvious tendency of sand saturated with water is to escape laterally under pressure. If this tendency can be counteracted by any means it may be possible, though not desirable, to utilise a foundation of this description. Sheet piling driven around the foundation often answers the purpose. A case in point is supplied by the tower of the Hamburg waterworks. This tower rises about 290 feet above the surface of the ground; it is built of brickwork, and rests on a circular block of concrete 56 feet in diameter and 11 feet thick. This in its turn rests on quicksand enclosed by sheet piling driven below the line of saturation of the river Elb. The gross weight supported amounts to 5,310 tons, which gives a pressure of about 2 tons per square foot on the quicksand.

A foundation of unequal density or compressibility is one to be avoided. When of equal compressibility any subsidence which takes place is uniform all over the foundation, and the structure erected on it is not materially damaged; but if one part of the foundation is more compressible than another, the structure has a tendency to be tilted out of the perpendicular, and cross-stresses are produced which may destroy its stability. In North Italy, as is well known, a number of leaning towers erected so far back as the twelfth and thirteenth centuries exist, and the reason assigned in the majority of cases for these being out of the perpendicular is the unequal compressibility of the foundations on which they are erected. A noted example occurs in the Campanile or leaning tower of Pisa. This is a circular tower 178 feet high, weighing 11,800 tons, with a base 60 feet in diameter, which is equivalent to a pressure of more than 4 tons per square foot. The soil under the foundation is of unequal density, it being more compressible in the direction in which the tower leans. That the settlement took place during the progress of the work may be inferred from the presence of iron bars introduced to hold the building together.

When foundations are too soft for building upon, and when the depth is too great for excavating to a reliable material, special means must be adopted. One method is that to which I have referred in the tower of the Hamburg waterworks. Another method is to consolidate the ground by timber piles, which was the method adopted in the Park Row building at New York. These bearing piles act as pillars, each supporting its own weight of the building. They may either be driven through the soft stratum until they reach a firm stratum underneath and penetrate a short distance into it, or, if that be impracticable owing to the great depth of the soft stratum, they may be supported wholly by friction in the soft stratum. From practical examples, the safe working loads on these piles may be taken as follows:—

For piles driven until they reach the firm ground, 1,000 lb. per square inch of the area of the pile may be allowed.

For piles standing in soft ground, and supported wholly by friction, 200 lb. per square inch of pile section is sufficient.

The best material is elm. The point of the pile should be fitted with an iron shoe, especially if stones or other impediments are to be met with, and the head should have an iron band to prevent its being split by the blows of the ram. They may be driven by hand or steam power. For the piers of bridges and similar structures iron screw piles or cylinders may be used.

In ordinary steel or iron structures, the main pillars usually rest on concrete, brickwork, or stone, and sometimes on all three in combination. When used in combination a concrete block is first laid, upon which several courses of brickwork may be built, and lastly a stone slab placed on the top. It is not often, however, that all three materials are used together, one or two generally being found sufficient. The intensity of pressure on the ground underneath may be modified to the required extent by increasing the area of the concrete block, or by stepping out to the necessary extent the lower courses of brickwork.

It is of great importance that the architect should be conversant with the working loads allowable on these materials.

The working pressure allowed on concrete foundations of sufficient thickness varies considerably according to the quality and the age of the concrete. Generally speaking, it may be taken as varying between 2 and 10 tons per square foot. It is not often, however, in work that has been executed that so high a pressure as the maximum mentioned exists, from 1 to 5 tons being most general. When pressures of 5 tons and upwards are to be provided for, great care should be bestowed on the manufacture of the concrete. All the materials composing it should be of good quality. All earthy substance, ashes, soft broken bricks, or greasy matter should be excluded; round smooth gravel or stone should be broken. The best Portland cement should be used; it ought to have a cohesive strength of 400 lb. per square inch after seven days from mixing. The proportions of the different ingredients should be four parts of broken hard brick or stone, one of clean sand, and one of cement. The concrete should be turned over twice dry, and three times wet, and well rammed in 12-inch layers. It is not advisable to send the concrete down a shoot or drop it from a height, unless it is afterwards remixed, as the larger pieces fall to the ground first, the smaller pieces next, and last of all the cement. Whenever used under water, the water should be still; a current will carry away the cement and leave only the ballast.

The crushing strength of bricks varies con-

siderably. It may be as low as 60 lb. per square inch, and as high as 1,700 lb. per square inch. Best blue bricks show a strength of 1,200 lb., while Stourbridge fine bricks will stand 1,700 lb. or even more. When great pressures have to be borne, the latter, or others similar in strength, should be used. It is desirable in a brick foundation that not only should the quality of the bricks be good, but also that they should be properly laid in good cement. Each course as laid should be well rammed down and bedded, leaving the layer of cement between each course as thin as possible. When this is done it is extraordinary what a brick foundation will support.

In connection with the failure of the foundations of the German mill already referred to, I had some experiments made as to what loads a brick pier was capable of sustaining. The test was made on a block of good red brickwork 3 feet 1 inch by 2 feet 11 inches, and 1 foot 4 inches thick. It was built of five courses bedded in cement, the bricks being pressed close together, with a thin layer of cement between them, and allowed to set for ten days before the test was made. The bricks were made by Messrs. Smethurst, of Oldham (and some of similar quality were tested by Mr. D. Kirkaldy, who found that it took a pressure equal to 480 tons per square foot to crush them). The pier composed of these bricks was inserted between iron plates and placed in a hydraulic press, the area of pressure on the brickwork being 5.3 square feet. Pressure was gradually applied until it reached 622 tons, which is equivalent to about 117 tons per square foot. The pressure was not increased beyond this point, as the press was incapable of anything greater. After the brickwork was removed and examined it exhibited no signs of failure, and was apparently as perfect as it was before the test.

According to the Berlin building regulations, with ordinary brickwork set in lime mortar a load of 7 tons per square foot is allowable for a working pressure, while with good hard bricks laid in cement 11 tons per square foot is recognised. Generally speaking, in this country anything between 2 and 10 tons per square foot is the practice.

With iron or steel pillars resting on stone, brick, or concrete foundations, there is another very important matter, frequently lost sight of, which should receive careful attention, and that is the proper bedding of the base of the pillar. When it rests on a block of stone, the stone should be carefully dressed off to a level surface, and the bottom surface of the base of the pillar should also be true. Some engineers insist upon having the latter machined. Even with these precautions, in very important work a layer of sheet lead might be introduced between the two surfaces. I remember several years ago when the present *Manchester Guardian*

newspaper offices were being built a failure arising from improper bedding occurred. The main cast-iron pillars supporting this building sustain very great loads. One day it was discovered that one of the cast-iron base plates was fractured, and also that the stone on which it rested was cracked. This occasioned a good deal of alarm for the safety of the building, and a celebrated London engineer was called in to report on the matter. He discovered that it arose from imperfect bedding. The top of the stone, instead of being tooled to a level surface, was hollow towards the centre, and the whole pressure was transmitted to two or three points towards the edges, which sufficiently accounted for the failure.

With concrete and brickwork foundations a

good plan, when it can be adopted, is to bed the base in cement. This often can be done with a loose base, but in the case of steel pillars, where the base is an integral part of the pillar itself, it cannot be satisfactorily adopted. The *modus operandi* in such cases is to leave the surface of the foundation rough, and place the pillar upon it with iron wedges inserted at the four corners. By means of these wedges the pillar can be raised to the right level and made plumb. When this is done liquid cement should be carefully run underneath. This effectually fills up all inequalities and evenly distributes the pressure over the foundation. The cement should be of such a nature as to set hard, and may vary in thickness from $\frac{1}{2}$ inch to 1 inch.



9, CONDUIT STREET, LONDON, W., 11th Nov. 1899.

CHRONICLE.

The Administration of Building By-laws in Non-Metropolitan Districts.*

The Deputation from the Institute to Mr. T. W. Russell, M.P., Parliamentary Secretary, Local Government Board, report to the Council as follows:

The Deputation attended at the Local Government Board on Thursday, 26th October, at 12 o'clock. There were present:—

Representing the Local Government Board:

Mr. T. W. RUSSELL, M.P.
Sir R. T. THORNE, M.D., *Medical Officers*,
Dr. H. F. PARSONS,
Mr. H. C. MONRO.
Mr. P. GORDON SMITH.

Representing the Royal Institute:

Mr. LACY W. RIDGE [F.],
Mr. H. D. SEARLES WOOD [F.],
Mr. W. J. LOCKE, *Secretary*.

* See Report of the Special Committee, and Resolutions thereon, JOURNAL, Vol. VI., 3rd series, pp. 449, 459.

(Mr. W. M. Fawcett, *Vice-President*, and Professor T. Roger Smith, who had been asked to attend, were unfortunately unable to do so.)

The Deputation, referring to the Report addressed to the Local Government Board by the Institute, laid before Mr. Russell the views of the Institute on the advisability of grouping the Model By-laws for non-Metropolitan districts in England and Wales, with the view to the adoption of such groups, and such only, as were applicable in particular localities; and the exemption from certain groups of by-laws of detached buildings standing within their own grounds; the uncertain requirements of local authorities as to the drawings required to be deposited, and their declining in some cases to give the grounds of their objections where approval of plans is refused; the establishment of a special technical Tribunal of Appeal; the extension to the provinces of the London system of dealing with rights as to party-walls, and other questions connected with the administration of building by-laws.

Mr. Russell, in reply, said that, as regards the principle underlying the Report, *i.e.* the advising by the Local Government Board of the local authorities as to what by-laws it would be best for them to adopt, it was always a delicate matter, owing to the jealousy of local authorities at the interference of a central authority. He thought the question of grouping the by-laws was a fair point for consideration. As regards the demand on the part of local authorities for drawings, such bodies often exceeded their rights; but in some instances powers were given to local authorities by special Acts. At the stage reached by the present Parliament, he could hold out no hope of legislation on the questions involved, but everything had been carefully noted, and should be submitted to the consideration of the expert advisers of the Board, who would report as to the extent it would be possible without legislation to

meet the views of the Royal Institute. In conclusion, Mr. Russell asked whether it would be possible to confer with the Deputation again. An answer having been given in the affirmative, the Deputation thanked Mr. Russell for his courteous hearing, and withdrew.

The late Sir Arthur Blomfield [F.R.S., A.R.A.]

There was an exceptionally good attendance of members and their friends at the opening meeting of the new session, and the President's Address was attentively followed by an interested and sympathetic audience. Before the formal business was proceeded with, the loss the Institute has so recently sustained by the death of Sir Arthur Blomfield, was announced by the President in the following terms:—

It is with the deepest regret and sorrow that I find my first words to you from this Chair must be to announce the decease of one of our oldest friends and members. Only last Monday morning I received a kindly letter from Sir Arthur Blomfield expressing his intention of being present here this evening, and also saying that Lady Blomfield would have accompanied him, were it not that she would be in Cheshire at the time. But that same evening a Higher Power willed otherwise, and suddenly—very suddenly—he passed away. Sir Arthur Blomfield was an ardent admirer of the Gothic style of architecture, and was one of the enthusiastic promoters of the revival of that style in the middle of this century. He was one of the School of Purists, and in all his buildings there was—as in his life—a strong element of self-restraint. Many of his buildings stand out from the current architecture of the day by their quiet refinement, and the total absence of affectation. He evidently felt that eccentricity is not art, and he always strove to adapt his architecture to the requirements of the day. His numerous works are so well known, that it would be superfluous to attempt to mention them here. An account of his career, however, will appear in the *JOURNAL*, and it is proposed to have an exhibition of drawings, &c., of his works at one of our evening meetings. To mention one of his works, not by any means the most important: the interior of Christ Church at St. Leonards is an object lesson to many of us in its simplicity, stately dignity, and proportion; so also is the nave of St. Saviour's, Southwark. Sir Arthur became a Fellow of the Institute in 1867. He was a Vice-President from 1886 to 1889, and he would have been President some years ago had he been willing to accept the office, which he felt himself compelled to decline, as he could not spare the necessary time. He was elected an Associate of the Royal Academy in 1888, and received the honour of knighthood the following year. He was the recipient of the Queen's Gold Medal in 1891. Sir Arthur was the stamp of man produced by the old schools of architecture, now fast

dying out; and, apart from his professional status, his modest and genial nature, his conversational powers, his kind and generous friendship, always willing to aid younger members of the profession with the fruits of his experience, endeared him to all who knew him. And, further, he was a staunch upholder of the necessity for honour, high principles, and morality amongst English gentlemen. This was emphatically proved by one of the recent acts of his life in connection with a certain society to which he belonged—many present will know to what I refer. His death is a great loss to both the architectural profession and the Institute.

By request of the President, the Secretary then read the following passages translated from a letter he had received that morning from M. Charles Lucas [*Hon. Corr. M. Paris*]:—

But first I must ask you to associate my cordial and respectful remembrance with all the eulogies that will not fail to be given at to-morrow's meeting to the memory of our honoured and regretted colleague, Sir Arthur Blomfield.

Though I scarcely knew the works of this master architect save through the designs published in the *Builder*, yet on the other hand I knew the man, the perfect gentleman, who showed such great authority and courtesy in presiding over the discussions of the architectural section of the International Congress of Hygiene in 1891.

My honoured colleagues, M. Fenger of Copenhagen, César Daly and M. Emile Trélat of Paris, M. Stubben of Cologne, had the privilege at that time of paying with me a fresh tribute to the professional qualities of Sir Arthur Blomfield—and the memory of it still remains with me.

The following resolution was then put from the Chair and passed by acclamation:—"That a note expressive of the sincere condolence and sympathy of the members of the Royal Institute of British Architects be sent to the widow and family of their deeply lamented colleague, Sir Arthur Blomfield."

His death, it may be added, occurred on Monday night, the 30th ult. He was seized with syncope from heart disease while at his club, and died before medical aid reached him. The funeral took place on Friday, the 3rd inst., at Broadway, in Worcestershire. A memorial service was held the same day at St. Mary's, Bryanston Square, which was attended by the President, the Hon. Secretary, members of the Council, the Secretary, and numerous members of the Institute.

The Statutory Examination.

At the General Meeting last Monday the Hon. Secretary, Mr. Alexander Graham, F.S.A., announced that the Statutory Examination held by the Institute pursuant to Section 140 of the London Building Act, took place in the rooms of the Institute on October 26 and 27. Two candidates attended, and the following passed, viz., CHARLES ARCHIBALD DANBURY, of 1 Wellington Road, Peckham. This gentleman has accordingly been granted by the Council a Certificate of Competency to act as District Surveyor in London.

Art at the Universities.

The *St. James's Gazette* recently drew attention to the following extract from an article in the *Cambridge Review* discussing the exhibition of prize work in the national competition of schools of art.

Cambridge is represented by one prize only, a silver medal awarded to Mr. F. E. Wiles for a book illustration and a menu card. "Good general composition," says the Examiners' report, "with a good sense of decoration pervades the whole, and the border is appropriate and graceful." Oxford does not appear at all, and we may well ask how it is that our University towns, which ought to foster all that is best in Art as well as Literature, fail so conspicuously here. The Examiners say in their report that they "are pleased to see an increase in the number of paintings of old buildings in the vicinity of the schools where they were produced." Though we naturally look to the great manufacturing centres for activity in producing designs for their staple manufactures, here at least is a field in which art students of a University town have special advantages. Lastly, we would fain ask how it is that the University does so little to foster a love of art among its undergraduates? The schoolboy who comes to a University with a genuine love for art, full of high ideals and hopes, finds nothing to encourage him. It was not till they were leaving Oxford that William Morris and Burne-Jones discovered their life-work. Why at least can we not have a course of University lectures on architecture, book illustration, early engravings, Japanese art, and many kindred subjects? Why not an Art Tripos?

One most heartily sympathises with the demand for a wider art life at our Universities, but the writer's question as to the establishment of an Art Tripos cannot be answered as airily as it is asked.

The Sanitary Inspectors' Examination Board.

The first examination for certificates of qualification for appointment of Sanitary Inspector, under Section 108 (2) (d) of the Public Health (London) Act 1891, will be held in London on Tuesday, 5th December 1899, and the four following days. Particulars will be forwarded on application to the Hon. Secretary, Wm. R. E. Coles, 1 Adelaide Buildings, London Bridge, E.C.

MINUTES. I.

At the First General Meeting (Ordinary) of the Session 1899-1900, held Monday, 6th November 1899, at 8 p.m., Mr. William Emerson, *President*, in the Chair, with 50 Fellows (including 24 members of the Council), 28 Associates (including two members of the Council), 4 Hon. Associates, and numerous visitors, the Minutes of the Meeting held Monday 26th June 1899 [Vol. VI., p. 488] were taken as read, and signed as correct.

The President having made feeling allusion to the sudden demise of Sir Arthur Blomfield, A.R.A., *Past Vice-President*

and *Royal Gold Medallist*, and referred to his architectural achievements and high personal qualities, moved, and it was thereupon

RESOLVED, That a note expressive of the sympathy and condolence of the Royal Institute of British Architects be sent to the widow and family of their deeply lamented colleague, Sir Arthur Blomfield, A.R.A.

The President also referred to the loss the Institute had sustained by the death of Mr. William Simpson, *Hon. Associate*, and on his motion it was agreed that a message of sympathy and condolence should be sent on behalf of the Institute to his widow and family.

The Hon. Secretary announced the decease of the following members:—Thomas Elworthy [F.] and Henry Hockey Burnell [A.].

The following member, attending for the first time since his election, was formally admitted and signed the Register, viz.—Louis Moore, of Woolston, Southampton, *Associate*.

The Hon. Secretary announced the results of the Statutory Examination for the office of District Surveyor under the London Building Act held on the 26th and 27th October, and that the Council had granted a Certificate of Competency to the successful candidate [see p. 19].

The following candidates for membership, found by the Council to be eligible and qualified according to the Charter and By-laws, and admitted by them to candidature, were recommended for election, namely:—As FELLOWS, Francis William Bedford [A.] (*Qualified* 1891, *Ashpitel prizeman* 1890, *Owen Jones Student* 1891-92) (Leeds); James Garry (West Hartlepool); Josiah Gunton; Edward John Lowther [A.]; Robert Falconer Macdonald [A.] (*Qualified* 1889); Herbert Read [A.] (*Qualified* 1889); Thomas Talliesin Rees [A.] (*Qualified* 1892) (Birkenhead); Francis William Troup [A.] (*Qualified* 1889). As ASSOCIATES, Raymond Turner Barker (*Probationer* 1890, *Student* 1898, *Qualified* 1899); Henry Thomas Bromley (*Probationer* 1893, *Student* 1897, *Qualified* 1899); Herbert Henry Dunstall (*Probationer* 1891, *Student* 1893, *Qualified* 1899); Hubert Ernest Gifford (*Probationer* 1895, *Student* 1897, *Qualified* 1899); Charles Hale (*Probationer* 1895, *Student* 1897, *Qualified* 1899) (Kettering); John Hunt (*Probationer* 1890, *Student* 1894, *Qualified* 1899); George Ernest Kendall (*Probationer* 1893, *Student* 1896, *Qualified* 1899) (Leicester); Thomas Geoffrey Lucas (*Probationer* 1890, *Student* 1891, *Qualified* 1899); Henry Alfred Neubronner (*Qualified* 1899) (Penang, Straits Settlements); Walter Gray Ross (*Probationer* 1893, *Student* 1895, *Qualified* 1899); William Moss Settle (*Probationer* 1894, *Student* 1896, *Qualified* 1899) (Walney, Barrow-in-Furness); Thomas Sharpe (*Probationer* 1891, *Student* 1894, *Qualified* 1899) (Manchester); Vincent Steadman (*Probationer* 1892, *Student* 1894, *Qualified* 1898) (Bristol); Henry Francis Traylen (*Probationer* 1892, *Student* 1894, *Qualified* 1899) (Leicester); Thomas Hubert Hardinge Vowles (*Probationer* 1892, *Student* 1894, *Qualified* 1899) (Oldham); Percy John Warman (*Probationer* 1894, *Student* 1896, *Qualified* 1899). As HON. ASSOCIATE, the Rev. John William Robbins, M.A. (Oriental College, Oxford).

The Opening Address of the Session having been delivered by the President, a vote of thanks, moved by Mr. J. Macvicar Anderson, *Past President*, and seconded by Mr. Joseph Smith [F.], President of the Sheffield Society of Architects, was passed to him by acclamation.

The proceedings then closed, and the Meeting separated at 9.40 p.m.

